PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference BA9332PCT	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/US2005/012465	International filing date *(day/month/year)* 12.04.2005	Priority date *(day/month/year)* 13.04.2004
International Patent Classification (IPC) or national classification and IPC INV. C07D231/16 A01N43/56		
Applicant E.I. DUPONT DE NEMOURS AND COMPANY		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 7 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☒	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
10.02.2006	11.05.2006
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Zellner, A Telephone No. +49 89 2399-8078

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US2005/012465

Box No. I Basis of the report

1. With regard to the **language**, this report is based on

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3(a) and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4(a))
   - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-11, 13, 16-48	as originally filed
12, 14, 15	received on 10.02.2006 with letter of 05.01.2006

Claims, Numbers

1-15	received on 10.02.2006 with letter of 05.01.2006

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 7-11

because:

☒ the said international application, or the said claims Nos. 7-11 relate to the following subject matter which does not require an international preliminary examination *(specify)*:

see separate sheet

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*.

☐ no international search report has been established for the said claims Nos.

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13*ter*.1(a) or (b) and 13*ter*.2.

☐ a meaningful opinion could not be formed without the tables related to the sequence listings; the applicant did not, within the prescribed time limit, furnish such tables in electronic form complying with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions, and such tables were not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in electronic form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☐ See separate sheet for further details

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US2005/012465

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-15
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-15
Industrial applicability (IA)	Yes:	Claims	1-6,12-15
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

The following documents (D) are referred to in this communication; the numbering will be adhered to in the rest of the procedure:

D1: WO 01/70671 A2 (E. I. DU PONT DE NEMOURS & CO., USA) 27 September 2001 (2001-09-27)
D2: WO 03/024222 A1 (E. I. DU PONT DE NEMOURS & CO., USA) 27 March 2003 (2003-03-27)
D3: WO 03/015518 A1 (E. I. DU PONT DE NEMOURS & CO., USA) 27 February 2003 (2003-02-27)
D4: WO 2004/067528 A (E.I. DU PONT DE NEMOURS AND COMPANY; HUGHES, KENNETH, ANDREW; LAHM, GE) 12 August 2004 (2004-08-12)

The present application relates to anthranilamides and theis use for controlling invertebrate pests.

The amendments filed with letters dated 04.01.2006 and 05.01.2006 were found to be in accordance with the requirements of Art. 19 PCT.

item **III**

Present claims 7-11 relate to methods of controlling an invertebrate pest. The treatment of a human or animal body is not excluded.

item **V**

1. Novelty (Art. 33(2) PCT)

Amended claim 1 now relates to compounds wherein R^2 is CN. Novelty can thus be acknowledged. The same applies to claims 2-15.

2. Inventive step (Art. 33(3) PCT)

It is not apparent at the present stage which technical effect is achieved by the particular substituent CN (see novelty). The technical problem to be solved can thus only be

considered as to provide alternative compounds to those disclosed in D1-D3. It would appear to be obvious for the skilled person to introduce further substituents or change substituents already present in compunds disclosed in D1-D3 in order to obtain alternative compounds. CN-substituents as such are suggested in D1 (p. 3, l. 16), D2 (p. 2, l. 28) and D3 (p. 2, l. 26). Their introduction in order to obtain compounds according to present claim 3 is thus not considered based on an inventive step. The application does not meet the requirements of Art. 33(3) PCT.

3. Industrial applicability (Art. 33(4) PCT)

Can be acknowledged for claims 1-6 and 12-15.

item **VI**

Document D4 was published after the priority date of the present application but before its international filing date. Its content would be considered as forming part of the state of the art if the priority of the present application was found to be invalid.

item **VII**

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D2 and D3 is not mentioned in the description, nor are these documents identified therein.

It is believed that one skilled in the art using the preceding description can utilize the present invention to its fullest extent. The following Examples are, therefore, to be construed as merely illustrative, and not limiting of the disclosure in any way whatsoever. ^{1}H NMR spectra are reported in ppm downfield from tetramethylsilane; s is singlet, d is doublet, t is triplet, q is quartet, m is multiplet, dd is doublet of doublets, br s is broad singlet.

EXAMPLE 1

Preparation of 3-bromo-1-(2-chlorophenyl)-*N*-[4-cyano-2-methyl-6-[[(1-methylethyl)amino]-carbonyl]phenyl]-1*H*-pyrazole-5-carboxamide

Step A: Preparation of (2*E*)-[(2-chlorophenyl)hydrazono]acetic acid

To a solution of 2-chlorophenyl hydrazine hydrochloride (18.8 g, 0.105 mol) in water (300 mL) at room temperature was added concentrated hydrochloric acid (13.2 g, 0.136 mol), followed by dropwise addition over 20 minutes of 50% glyoxylic acid (17.1 g, 0.115 mol) to form a thick precipitate. The reaction mixture was then stirred for 30 minutes. The product was isolated by filtration, washed with water, and then dissolved in ethyl acetate (400 mL). The resulting solution was dried ($MgSO_4$) and concentrated under reduced pressure to afford the title product as a tan solid (20.5 g).

^{1}H NMR (Me_2SO-d_6) δ 12.45 (s, 1H), 10.7 (s, 1H), 7.59 (d, 1H), 7.54 (s, 1H), 7.40 (d, 1H), 7.23 (t, 1H), 6.98 (t, 1H).

Step B: Preparation of (2-chlorophenyl)carbonohydrazonic dibromide

To a solution of the product from Step A (20.5 g, 0.103 mol) in *N,N*-dimethylformamide (188 mL) at 0 °C was added *N*-bromosuccinimide (35.7 g, 0.206 mol) portionwise over 30 min. The resulting mixture was stirred overnight at ambient temperature. The reaction mixture was diluted with water (150 mL) and extracted with diethyl ether (3 x 200 mL). The combined organic extracts were dried ($MgSO_4$), absorbed onto silica gel and purified by chromatography to afford the title compound as a red oil (12.0 g).

^{1}H NMR ($CDCl_3$) δ 8.15 (br d, 1H), 7.41 (d, 1H), 7.31 (d, 1H), 7.21 (d, 1H), 6.90 (d, 1H).

Step C: Preparation of methyl 3-bromo-1-(2-chlorophenyl)-4,5-dihydro-1*H*-pyrazole-5-carboxylate

In a solution of the product from Step B (12.0 g, 38.5 mmol) in *N,N*-dimethylformamide (110 mL) was added methyl acrylate (13.85 mL, 153.8 mmol) in one portion, followed by dropwise addition of *N,N*-diisopropylethylamine (7.38 mL, 42.3 mmol) over 15 minutes. The reaction mixture was then stirred at ambient temperature for 1 h. The reaction mixture was diluted with water (200 mL) and extracted with diethyl ether (2 x 200 mL). The combined extracts were washed with water and brine. The ether extracts

for 20 hours. The reaction mixture was then cooled, and most of the dimethylformamide was removed by concentration on a rotary evaporator at reduced pressure. Water (200 mL) was added to the oily solid followed by ethylenediamine (20 mL), and the mixture was stirred vigorously to dissolve most of the solids. Residual solids were removed by filtration, and concentrated hydrochloric acid was added to the filtrate to adjust the pH to 5. As the pH decreased, some solids precipitated. The resulting mixture was partitioned between ethyl acetate and water. The separated organic solution was dried ($MgSO_4$), filtered and concentrated under reduced pressure. The residual solids were triturated with a mixture of ether, hexane and ethyl acetate to afford the title compound as a tan solid (7.61 g).
^1H NMR (Me_2SO-d_6) δ 7.97 (s, 1H), 7.50 (s, 1H), 7.3-7.5 (br s, 1H), 2.12 (s, 3H).

Step H: Preparation of 2-[3-bromo-1-(2-chlorophenyl)-1*H*-pyrazol-5-yl]-8-methyl-4-oxo-4*H*-3,1-benzoxazine-6-carbonitrile

To a solution of 3-bromo-1-(2-chlorophenyl)-1*H*-pyrazole-5-carboxylic acid (i.e. the carboxylic acid product of Step E) (2.0 g, 6.29 mmol) and 2-amino-3-methyl-5-cyanobenzoic acid (i.e. the product of Step G) (1.1 g, 6.29 mmol) in acetonitrile (60 mL) at room temperature was added 3-picoline (3.2 mL, 32.7 mmol). The reaction mixture was stirred for 5 minutes and then cooled to –10 °C. Methanesulfonyl chloride (1.3 mL, 16.4 mmol) was then added dropwise, and after completion of the addition the reaction mixture was warmed to room temperature. On stirring overnight at room temperature, the reaction mixture formed a solid precipitate. The solid was isolated by filtration, washed with water, dissolved in excess methylene chloride and dried ($MgSO_4$). After removal of solvent, the residue was purified by chromatography on silica gel to afford the title compound (1.9 g).
^1H NMR ($CDCl_3$) δ 8.31 (s, 1H), 7.73 (s,1H), 7.45-7.6 (m, 4H), 7.31 (s,1H), 1.84 (s,1H).

Step I: Preparation of 3-bromo-1-(2-chlorophenyl)-*N*-[4-cyano-2-methyl-6-[[(1-methylethyl)amino]carbonyl]phenyl]-1*H*-pyrazole-5-carboxamide

To a solution of 2-[3-bromo-1-(2-chlorophenyl)-1*H*-pyrazol-5-yl]-8-methyl-4-oxo-4*H*-3,1-benzoxazine-6-carbonitrile (i.e. the product of Step H) (2.7 g, 5.7 mmol) in acetonitrile (150 mL) was added dropwise isopropylamine (1.95 mL, 22.9 mmol) and then the reaction was warmed to about 50 °C using a water bath until all solids dissolved. The reaction mixture was stirred at ambient temperature for 2 hours. As the reaction progressed, a thick white solid formed. The solids were isolated by filtration and washed with diethyl ether and hexane to afford the title compound, a compound of the present invention, as a white solid (2.34 g) that melted at 145-149 °C.
^1H NMR ($CDCl_3$) δ 10.5 (br s, 1H), 7.59 (d, 1H), 7.56 (m, 2H), 7.4 (m, 3H), 7.02 (s, 1H), 5.98 (br d, 1H), 4.2 (m, 1H), 2.25 (s, 3H), 1.27 (d, 6H)

EXAMPLE 2

Preparation of 3-bromo-1-(2-chlorophenyl)-*N*-[4-cyano-2-methyl-6-[(methylamino)-carbonyl]phenyl]-1*H*-pyrazole-5-carboxamide

To a solution of 2-[3-bromo-1-(2-chlorophenyl)-1*H*-pyrazol-5-yl]-8-methyl-4-oxo-4*H*-3,1-benzoxazine-6-carbonitrile (i.e. the product of Example 1, Step H) (2.7 g, 5.7 mmol) in acetonitrile (150 mL) was added dropwise methylamine (2.0 M solution in THF, 18.0 mL, 36.0 mmol), and the mixture was then stirred at room temperature for 30 minutes. As the reaction progressed, a thick white solid formed. The reaction mixture was cooled to 0 °C, and the solids were isolated by filtration and purified by silica gel chromatography to afford the title compound, a compound of the present invention, as a white solid (2.1 g) that melted at 242-243 °C.

^{1}H NMR ($CDCl_3$) δ 10.45 (br s, 1H), 7.5-7.6 (m, 3H), 7.4 (m, 3H), 7.03 (s, 1H), 6.3 (br d, 1H), 2.98 (d, 3H), 2.25 (s, 3H).

EXAMPLE 3

Preparation of 3-bromo-1-(2-chlorophenyl)-*N*-[2, 4-dichloro-6-[(methylamino)-carbonyl]phenyl]-1*H*-pyrazole-5-carboxamide

Step A: Preparation of 2-[3-bromo-1-(2-chlorophenyl)-1*H*-pyrazol-5-yl]-6,8-dichloro-4*H*-3,1-benzoxazin-4-one

To a mixture of 3-bromo-1-(2-chlorophenyl)-1*H*-pyrazole-5-carboxylic acid (i.e. the carboxylic acid product of Example 1, Step E) (3.0 g, 9.44 mmol) and 3,5-dichloroanthranilic acid (1.94 g, 9.44 mmol) in acetonitrile (60 mL) was added 3-picoline (4.81 mL, 49.1 mmol) at room temperature, and the reaction mixture was stirred for 5 minutes. The reaction mixture was cooled to –10 °C and methanesulfonyl chloride (1.91 mL, 24.56 mmol) in acetonitrile (5 mL) was added dropwise. The reaction mixture was warmed to room temperature and stirred overnight. The resulting solids were isolated by filtration, washed with water, then dissolved in excess methylene chloride and dried ($MgSO_4$). The solvent was evaporated under reduced pressure, and the residual solid was purified by chromatography on silica gel to afford the title compound (2.0 g).

^{1}H NMR ($CDCl_3$) δ 8.0 (s, 1H), 7.72 (s, 1H), 7.4-7.55 (m, 4H), 7.28 (s, 1H)

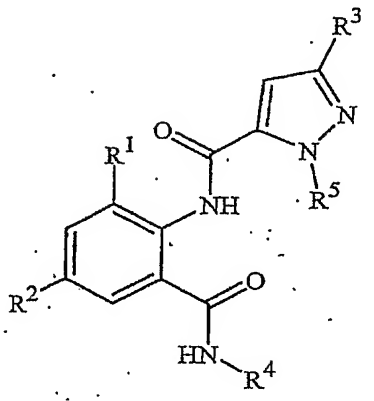
Step B: Preparation of 3-bromo-1-(2-chlorophenyl)-*N*-[2,4-dichloro-6-[(methylamino)carbonyl]phenyl]-1*H*-pyrazole-5-carboxamide

To a solution of 2-[3-bromo-1-(2-chlorophenyl)-1*H*-pyrazol-5-yl]-6,8-dichloro-4*H*-3,1-benzoxazin-4-one (i.e. the product of Step A) (2.4 g, 8.8 mmol) in acetonitrile (150 mL) cooled to 0 °C was added dropwise methylamine (2.0 M solution in THF, 17.7 mL, 35.4 mmol), and the reaction mixture was stirred for 15 min. As the reaction progressed, a thick white solid formed. The solids were isolated by filtration and purified by silica gel

CLAIMS

What is claimed is:

1. A compound of Formula 1, an *N*-oxide or a salt thereof



1

wherein

R^1 is Me, Cl, Br or I;

R^2 is -CN;

R^3 is Cl, Br, CF_3, OCH_2CF_3 or OCF_2H;

R^4 is H; or C_1–C_4 alkyl, C_2–C_4 alkenyl or C_2–C_4 alkynyl, each optionally substituted with CN or SMe; and

R^5 is phenyl substituted with 1 to 3 substituents selected from the group consisting of F, Cl, Br and Me.

2. The compound of Claim 1 wherein:

R^3 is Cl, Br or CF_3;

R^4 is Me, Et, *i*-Pr or *t*-Bu; and

R^5 is 2-chlorophenyl, 2-fluorophenyl, 2-bromophenyl, 2,4-dichlorophenyl, 2-chloro- 4-fluorophenyl, 2,6-dichlorophenyl, 2,6-difluorophenyl or 2,4,6-trichlorophenyl.

3. A composition for controlling an invertebrate pest comprising a biologically effective amount of a compound of Claim 1 and at least one additional component selected from the group consisting of a surfactant, a solid diluent and a liquid diluent, said composition optionally further comprising an effective amount of at least one additional biologically active compound or agent.

4. A composition of Claim 3 wherein at least one additional biologically active compound or agent is selected from insecticides of the group consisting of pyrethroids, carbamates, neonicotinoids, neuronal sodium channel blockers, insecticidal macrocyclic lactones, γ–aminobutyric acid antagonists, insecticidal ureas, juvenile hormone mimics, members of *Bacillus thuringiensis*, *Bacillus thuringiensis* delta endotoxin, and naturally occurring or genetically modified viral insecticides.

5. The composition of Claim 3 wherein the at least one additional biologically active compound or agent is selected from the group consisting of abamectin, acephate, acetamiprid, acetoprole, amidoflumet, avermectin, azadirachtin, azinphos-methyl, bifenthrin, bifenazate, bistrifluron, buprofezin, carbofuran, chlorfenapyr, chlorfluazuron, chlorpyrifos, chlorpyrifos-methyl, chromafenozide, clothianidin, cyfluthrin, beta-cyfluthrin, cyhalothrin, lambda-cyhalothrin, cypermethrin, cyromazine, deltamethrin, diafenthiuron, diazinon, diflubenzuron, dimethoate, dinotefuran, diofenolan, emamectin, endosulfan, esfenvalerate, ethiprole, fenothicarb, fenoxycarb, fenpropathrin, fenvalerate, fipronil, flonicamid, flucythrinate, tau-fluvalinate, flufenerim, flufenoxuron, gamma-chalothrin, halofenozide, hexaflumuron, imidacloprid, indoxacarb, isofenphos, lufenuron, malathion, metaldehyde, methamidophos, methidathion, methomyl, methoprene, methoxychlor, methoxyfenozide, metofluthrin, monocrotophos, methoxyfenozide, novaluron, noviflumuron, oxamyl, parathion, parathion-methyl, permethrin, phorate, phosalone, phosmet, phosphamidon, pirimicarb, profenofos, profluthrin, protrifenbute, pymetrozine, pyridalyl, pyriproxyfen, rotenone, spinosad, spiromesifen, sulprofos, tebufenozide, teflubenzuron, tefluthrin, terbufos, tetrachlorvinphos, thiacloprid, thiamethoxam, thiodicarb, thiosultap-sodium, tolfenpyrad, tralomethrin, trichlorfon, triflumuron, aldicarb, fenamiphos, amitraz, chinomethionat, chlorobenzilate, cyhexatin, dicofol, dienochlor, etoxazole, fenazaquin, fenbutatin oxide, fenpyroximate, hexythiazox, propargite, pyridaben, tebufenpyrad, *Bacillus thuringiensis aizawai*, *Bacillus thuringiensis kurstaki*, *Bacillus thuringiensis* delta endotoxin, baculovirus, entomopathogenic bacteria, entomopathogenic virus and entomopathogenic fungi.

6. The composition of Claim 3 wherein the at least one additional biologically active compound or agent is selected from the group consisting of cypermethrin, cyhalothrin, cyfluthrin and beta-cyfluthrin, esfenvalerate,

fenvalerate, tralomethrin, fenothicarb, methomyl, oxamyl, thiodicarb, acetamiprid, clothianidin, imidacloprid, thiamethoxam, thiacloprid, indoxacarb, spinosad, abamectin, avermectin, emamectin, endosulfan, ethiprole, fipronil, flufenoxuron, triflumuron, diofenolan, pyriproxyfen, pymetrozine, amitraz, *Bacillus thuringiensis aizawai*, *Bacillus thuringiensis kurstaki*, *Bacillus thuringiensis* delta endotoxin and entomophagous fungi.

7. A method for controlling an invertebrate pest comprising contacting the invertebrate pest or its environment with a biologically effective amount of a compound of Claim 1.

8. A method for controlling an invertebrate pest comprising contacting the invertebrate pest or its environment with a biologically effective amount of a composition of Claim 3.

9. The method of Claim 7 or Claim 8 wherein the invertebrate pest is a cockroach, an ant or a termite which is contacted by the compound by consuming a bait composition comprising the compound.

10. The method of Claim 7 or Claim 8 wherein the invertebrate pest is a mosquito, a black fly, a stable, fly, a deer fly, a horse fly, a wasp, a yellow jacket, a hornet, a tick, a spider, an ant, or a gnat which is contacted by a spray composition comprising the compound dispensed from a spray container.

11. The method of Claim 8 wherein a plant is contacted with the composition applied as a soil drench of a liquid formulation.

12. The composition of Claim 3 in the form of a soil drench liquid formulation.

13. A spray composition, comprising:
(a) a compound of Claim 1; and
(b) a propellant.

14. A bait composition, comprising:
(a) a compound of Claim 1;
(b) one or more food materials;

(c) optionally an attractant; and

(d) optionally a humectant.

15. A device for controlling an invertebrate pest, comprising:

(a) the bait composition of Claim 14; and

(b) a housing adapted to receive the bait composition, wherein the housing has at least one opening sized to permit the invertebrate pest to pass through the opening so the invertebrate pest can gain access to the bait composition from a location outside the housing, and wherein the housing is further adapted to be placed in or near a locus of potential or known activity for the invertebrate pest.